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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|-------------------------------|------------------------|
| 10/507,418 | 02/17/2005 | Michael Zeitler | 3787.1000000 | 6305 |
| 21005 7590 08/01/2007 HAMILTON, BROOK, SMITH & REYNOLDS, P.C. 530 VIRGINIA ROAD P.O. BOX 9133 CONCORD, MA 01742-9133 | | | EXAMINER SELLERS, ROBERT E | |
| | | | ART UNIT 1712 | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/507,418 | Applicant(s) ZEITLER ET AL. | |
| | Examiner Robert Sellers | Art Unit 1712 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-33 is/are pending in the application.
- 4a) Of the above claim(s) 28-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>9/13/04, 2/24/05 & 3/24/06</u> . | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1712

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted

Group I, claims 14-27, drawn to a method for the production of epoxy-terminated polysulphides by reacting thiol-terminated polysulphides with excess epichlorohydrin, adding alkaline lye in two stages, azeotropically distilling the water and epichlorohydrin, separating the epichlorohydrin phase from the deposited salts, and removing the epichlorohydrin by distillation.

Group II, claim 28, drawn to the method of claim 14 wherein after the azeotropic distillation of the water, the alkali chloride is filtered, washed with epichlorohydrin, and any adhering epichlorohydrin is dried out by a heated inert gas.

Group III, claim 29, drawn to the method of claim 14 wherein the virtually water-free organic phase is separated by decantation or lifting out the eliminated salts.

Group IV, claims 30-33, drawn to the method of claim 14 wherein the epoxy-terminated polysulphide is purified by distillation.

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because they lack the same or corresponding special technical feature under PCT Rule 13.2 for the following reason.

Art Unit: 1712

2. Bender et al. Patent No. 2,731,437 (cols. 2-3, Example 1) shows a method for producing an epoxide-terminated polysulfide by reacting a thiol-terminated polysulfide (col. 1, lines 36-41) with excess epichlorohydrin (col. 1, lines 55-57 and col. 2, lines 12-16) in the presence of 50% aqueous sodium hydroxide solution added in two stages (col. 3, lines 1-8), distilling the reaction product which removes the water and epichlorohydrin in separate phases (Booth et al. Patent No. 5,173,549, col. 5, Example 2, lines 24-27), dissolving in toluene and distilling it which removes the epichlorohydrin (Booth et al., col. 5, lines 30-32).

Therefore, the special technical feature does not make a contribution over the prior art, thereby validating a holding of lack of unity.

3. This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

The species are as follows:

a) Conducting the reaction with or without the phase transfer catalyst of claims 25-27, wherein if its presence is elected, a particular species is identified.

b) Contingent upon the election of Group IV, the purification by thin-layer distillation with or without the azeotrope-forming agent of claims 32 and 33, wherein if its presence is elected, a particular species is designated from claim 33.

Art Unit: 1712

Applicant is required, in reply to this action, to elect a single species to which the claims shall be restricted if no generic claim is finally held to be allowable. The reply must also identify the claims readable on the elected species, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered non-responsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species (MPEP § 809.02(a)).

Claims 14-24 and 28-31 are generic.

4. The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the reasons espoused with respect to the holding of lack of unity hereinabove.

During a telephone conversation with Alexander Akheizer on June 19, 2007, a provisional election was made with traverse to prosecute the invention of Group I and the presence of methyloctylammonium chloride as a phase transfer catalyst, claims 14-27. Affirmation of this election must be made by applicant in replying to this Office action. Claims 28-33 are withdrawn from further consideration under 37 CFR 1.142(b), as being drawn to non-elected inventions.

Art Unit: 1712

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 14-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bender et al. Patent No. 2,731,437 and Booth et al. Patent No. 5,173,549.

5. Bender et al. (cols. 2-3, Example 1) shows a method for producing diglycidyl thioethers of polysulfide dithiols by

a) mixing 150 parts (1 mole SH) of a polysulfide dithiol (col. 1, lines 36-40) and an excess of 277 parts (3 moles) of epichlorohydrin,

b) adding 50% aqueous sodium hydroxide in two stages (col. 3, lines 1-8),

c) distilling the reaction product and dissolving it in toluene, and

d) separating the toluene solution and distilling it to isolate the diglycidyl thioether of a dithiol polysulfide.

6. Booth et al. (col. 5, Example 2) shows a process for preparing an epoxide-capped polysulfide (col. 2, lines 9-14) by

a) mixing a thiol-terminated polysulfide (col. 2, lines 40-51) in excess epichlorohydrin ECH (col. 2, lines 21-22),

b) adding dropwise an excess (col. 3, lines 43-45) of 50% aqueous sodium hydroxide,

c) azeotropically distilling the water and epichlorohydrin (col. 5, lines 24-26),

d) separating the epichlorohydrin (col. 5, lines 26-27), and

e) removing the epichlorohydrin by distillation.

7. Bender et al. does not identify the distilled components during steps b) and c).

It would have been obvious conduct distilling step c) of Bender et al. to separate the water from the epichlorohydrin as accomplished in steps c) and d) of Booth et al. It would have been obvious to implement distilling step d) of Bender et al. to isolate the diglycidyl thioether of a dithiol polysulfide from the epichlorohydrin as achieved in step d) of Booth et al.

8. Booth et al. does not recite the two-stage addition of aqueous sodium hydroxide.

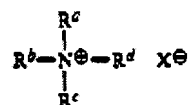
It would have been obvious the add the aqueous sodium hydroxide of Booth et al. by the two-stage procedure of Bender et al. since both the dropwise addition of Booth et al. and the two-stage introduction of Bender et al. serves to control the reaction temperature (Bender et al., col. 3, lines 24-27).

Claims 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bender et al. and Booth et al. as applied to the claims hereinabove, and further in view of Wirth et al. Patent No. 4,931,576; Japanese Patent No. 62-238278 and HCAPLUS accession no. 1986:148258 which is the abstract for the Synthesis article by Gu et al.

The claimed reaction carried out in the presence of a phase transfer catalyst (claim 25) of a quaternary ammonium salt (claim 26) such as methyltrioctylammonium chloride is not recited.

Art Unit: 1712

9. Wirth et al. reports the reaction of epichlorohydrin with a mercaptan in the presence of a phase transfer catalyst (col. 1, lines 29-59) such as a quaternary ammonium salt having the formula




wherein R^a , R^b , R^c and R^d are methyl or n-octyl and X^- is chloride (col. 4, lines 51-67).

10. The Japanese patent discloses the reaction of a polyvalent phenol with epichlorohydrin in the presence of trioctylmethylammonium chloride (HCAPLUS abstract and second page, penultimate IT, line 5).

11. Gu et al. teaches the reaction of a diol with epichlorohydrin involving a phase transfer catalyst of methyltrioctylammonium chloride (HCAPLUS abstract, third IT, registry no. 5137-55-3).

12. Wirth et al. acknowledges the use of a quaternary ammonium chloride wherein the R groups embrace methyl and octyl substituents as a phase transfer catalyst for a reaction involving SH and epoxy groups. The Japanese patent recognize the use of methyltrioctylammonium chloride as a phase transfer catalyst for a similar reaction involving OH and epoxy groups. Accordingly, it would have been obvious to employ the tetraalkyl ammonium chloride phase transfer catalyst of Wirth et al. such as the methyltrioctylammonium chloride of the Japanese patent and Gu et al. in the reactions of Bender et al. and Booth et al. in order to optimize the reaction rate and/or temperature.

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